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(54) **LIGHT EMITTING DEVICE PACKAGE**

GEHÄUSE MIT LICHEMITTIERENDER VORRICHTUNG

BOITIER DE DISPOSITIF ELECTROLUMINESCENT

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(56) References cited:
JP-A- 2002 094 122 **KR-A- 20080 008 767**
KR-A- 20080 018 096 **KR-A- 20080 079 745**
KR-B1- 100 580 765 **KR-B1- 100 691 441**
US-A- 5 821 615 **US-A1- 2006 022 216**
US-A1- 2006 124 941 **US-A1- 2007 019 416**
US-A1- 2007 081 313

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Description

Technical Field

[0001] Embodiments of the invention relate to a light emitting device package.

Background Art

[0002] Group III-V nitride semiconductors have been in the spotlight as a core material for light emitting devices, such as light emitting diodes (LEDs), laser diodes (LDs), and the like, because of their excellent physical and chemical properties. Group III-V nitride semiconductors are composed of a semiconductor material having the chemical formula of $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{N}$ (where $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq x+y \leq 1$). LEDs are a kind of semiconductor device that converts electricity into infrared rays or light by using characteristics of a compound semiconductor to transmit and receive a signal, and they are used as light sources.

[0003] LEDs or LDs made of nitride semiconductor materials are widely adopted in light emitting devices for obtaining light, and are applied as light sources for various products, for example, a light emission part for a keypad of a mobile phone, an electrical sign board, and a lighting device.

[0004] Documents US 2007/081313 and KR 100 691 441 disclose relevant prior art of a light emitting device package.

Disclosure of Invention Technical Problem

[0005] Embodiments provide a light emitting device package in which a wire and a light emitting device are disposed within one cavity.

[0006] Embodiments provide a light emitting device package in which a light emitting device and one wire are disposed in a phosphor layer disposed within a cavity.

[0007] Embodiments provide a light emitting device package in which a lead electrode is formed by one cavity of a multi-layered cavity.

[0008] Embodiments provide a light emitting device package in which at least one lead electrode is exposed to a bottom surface of a package body.

Technical Solution

[0009] The invention provides a light emitting device as defined in claim 1.

Advantageous Effects

[0010] According to the embodiments, the color-coordinate distribution of the white light of the light emitting device package may be minimized.

[0011] According to the embodiments, the light emitting device package may improve the color-coordinate

yield of the white light.

[0012] According to the embodiments, the color-coordinate yield may be improved, and the heat may be effectively radiated to improve the reliability of the light emitting device package.

Brief Description of Drawings

[0013]

Fig. 1 is a plan view of a first example of a light emitting device package.

Fig. 2 is a side sectional view taken along line A-A of Fig. 1.

Fig. 3 is a side sectional view taken along line B-B of Fig. 1.

Fig. 4 is a plan view of a light emitting device according to an embodiment.

Fig. 5 is a plan view of a second example of a light emitting device.

Fig. 6 is a plan view of a third example of a light emitting device.

Fig. 7 is a plan view of a fourth example of a light emitting device.

Fig. 8 is a plan view of a fifth example of a light emitting device.

Best Mode for Carrying out the Invention

[0014] Reference will now be made in detail to the embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings. In the description, a size and a thickness of each layer in the accompanying drawings is illustrated as an example, and thus, are not limited thereto.

[0015] Fig. 1 is a plan view of a first example of a light emitting device package. Fig. 2 is a side sectional view taken along line A-A of Fig. 1, and Fig. 3 is a side sectional view taken along line B-B of Fig. 1.

[0016] Referring to Figs. 1 to 3, a light emitting package 100 including a package body 110, a first cavity 112, a second cavity 115, lead electrodes 121 and 123, a light emitting device 130, a phosphor layer 140, and a resin layer 150.

[0017] The package body 110 may include one of a printed circuit board (PCB) type substrate, a ceramic type substrate, and a lead frame type substrate. The package body 110 may have an injection molding structure using a resin material or a stacked structure, but is not limited thereto. Hereinafter, for convenience of description, the lead frame type substrate will be described in the following embodiments as an example. The package body 110 may be integrally injection-molded using the resin material (e.g., polyphthalamide (PPA)) or a material having a high reflective characteristic.

[0018] The package body 110 may be formed of the resin material such as polycarbonate (PC) and PPA, a silicon material, or a ceramic material. The package body

110 may have the injection molding structure or the stacked structure.

[0019] A plurality of lead electrodes 121 and 123 is disposed on the package body 110. The lead electrodes 121 and 123 may include at least one of a PCB type electrode, a ceramic type electrode, a lead frame type electrode, and a via type electrode. Hereinafter, for convenience of description, the lead frame type electrode will be described in the following embodiments as an example.

[0020] The first cavity 112 and the second cavity 115 are formed in the package body 110. The first cavity 112 has an opened upper side, and the second cavity 115 is defined at a predetermined position under the first cavity 112. As shown, a portion of the bottom of the first cavity 112 is defined by an annular surface of the package body with an opening in a central portion thereof.

[0021] A surface of the first cavity 112 may have a circular shape, a polygonal shape, an oval shape, or any other shape, and the first cavity 112 may have a predetermined depth. A circumferential surface of the first cavity 112 may be perpendicular to a bottom surface thereof or inclined outwardly (or inwardly) at a predetermined angle.

[0022] The second cavity 115 is formed under a central portion of the first cavity 112 in the central portion to the annular surface of the package body that defines the bottom of the first cavity, at approximately the line B-B of Fig. 1, but such is not required. The size of the second cavity 115 may be smaller than the size of the first cavity 112. A surface of the second cavity 115 may have a circular shape, an oval shape, a polygonal shape, or other shapes. The second cavity 115 has a diameter less than that of the first cavity 112 and a predetermined depth. Here, the first and second cavities 112 and 115 may have the same surface configuration, for example, a reflective cup having a circular shape or a polygonal shape, but the shape of the reflective cup is not limited thereto.

[0023] As shown in FIG. 1, the second cavity 115 is located in approximately a central portion of the package body 110. With respect to the line B-B of Fig. 1 that approximately bisects the second cavity 115. Therein, a first side of the first cavity 112 about the line B-B may be referred to, which contains both a portion of the second lead electrode 123 and a portion of the first lead electrode 121. The opposite side of the first cavity 112 about the line B-B from the first side may be referred to as a second side, which contains the first lead electrode 121, but not the second lead electrode 123. The second cavity 115 straddles both the first and second sides of the first cavity 112.

[0024] The second cavity 115 contains a portion of a first lead electrode 121 so that a first lead electrode 121 has a portion which cups the second cavity 115. The portion of the first lead electrode 121 cups the second cavity 115 by entirely covering a side surface and a bottom of the second cavity 121, but not the exposed top.

[0025] The first lead electrode 121 extends from one

side of a bottom surface of the first cavity 112 to the other side thereof. A second cavity 115 is defined between one side and the other side of the first cavity 112 and has a predetermined depth. The first lead electrode 121 is formed in a side of the bottom surface of the first cavity 112, i.e., either an entire surface or a majority surface of the side of the bottom surface of the first cavity 112.

[0026] The first lead electrode 121 is spaced from the second lead electrode 123 at the other side of the first cavity 112.

[0027] The first lead electrode 121 defines a bottom surface and a circumferential surface of the second cavity 115. That is, the first lead electrode 121 forms the second cavity 115.

[0028] The second cavity 115 formed by the first lead electrode 121 may have a vessel or cup shape having a smooth curvature. The first lead electrode 121 may be perpendicular or inclined to a circumferential surface of the second cavity 115 in the bottom surface 111 of the package body 110.

[0029] The first lead electrode 121 may have the other end PI exposed to one side of the package body 110 and bent downwardly from the package body 110 or bent toward a bottom surface of the package body 110. The other end PI of the first lead electrode 121 may be used as an external electrode.

[0030] Referring to Fig. 2, a portion of the first lead electrode 121 constitutes or formed along a bottom surface and a circumferential surface of the second cavity 115. and a bottom surface 121A of the second cavity 115 is disposed on a bottom surface 111 of the package body 110, but such is not required. The first lead electrode 121 is disposed under the light emitting device 130 within the second cavity 115. Heat transferred from the light emitting device 130 may be radiated to the outside through a bottom surface of the first lead electrode 121. Thus, heat may be effectively radiated through the first lead electrode 121.

[0031] The bottom surface of the first lead electrode 121 disposed within the second cavity 115 may be flush with the bottom surface of the package body 110.

[0032] Referring to Fig. 1, the other end PI of the first lead electrode 121 is spaced from one end of the second lead electrode 123. The first lead electrode 121 constitutes a portion of the bottom surface of the first cavity 112 or an entire surface of the second cavity 115.

[0033] The second lead electrode 123 has one end disposed on a portion of the first cavity 112 of the package body 110 and spaced a predetermined distance from the first lead electrode 121. The second lead electrode 123 may have the other end P2 exposed to the other side of the package body 110 and bent downwardly from the package body 110 or bent toward the bottom surface of the package body 110. The other end P2 of the second lead electrode 123 may be used as a lead electrode.

[0034] The other end PI of the first lead electrode 121 may be provided in one or plurality and the other end P2 of the second lead electrode 123 may be provided in one

or plurality. That is, the other end P1 of the first lead electrode 121 may be divided into a plurality of pieces, and the other end P2 of the second lead electrode 123 may be divided into a plurality pieces. As a result, electronic reliability may be improved.

[0035] The first and second lead electrodes 121 and 123 are separated from each other at a portion of the first cavity 112 to form an opened structure. At least one light emitting device 130 is disposed on the first lead electrode 121, and the light emitting device 130 is attached to the first read electrode 121 using an adhesive. The light emitting device 130 is connected to the first lead electrode 121 using a first wire 132 and connected to the second lead electrode 123 using a second wire 134. Here, the first wire 132 is bonded to the first lead electrode 121 and the light emitting device 130 within the second cavity 115. The second wire 134 has one end bonded to the light emitting device 130 disposed within the second cavity 115 and the other end bonded to the second lead electrode 123 disposed within the first cavity 112.

[0036] The first wire 132 may be disposed within the phosphor layer 140. In this case, since the first wire 132 is disposed within the phosphor layer 140, defect occurrence and efficiency drooping due to the resin layer 150 or the formation thereof may be reduced or prevented. Also, the first wire 132 may be disposed at a position higher or lower than that of a surface of the phosphor layer 140, but is not limited hereto. Here, since the first wire 132 is disposed within the second cavity 115 or the phosphor layer 140, a wire bonding defect may be reduced or prevented, and also, light efficiency may be improved.

[0037] The light emitting device 130 may include at least one blue LED chip. Alternatively, a colored LED chip such as a green LED chip or a red LED chip or an ultraviolet (UV) LED chip may be used as the light emitting device 130. A lateral-type semiconductor light emitting device will be described below as an example of the LED chip.

[0038] Since the first wire 132 is disposed within the second cavity 115, the first wire 132 may be disposed further close to the light emitting device 130 and disposed on a layer different from the second wire 134.

[0039] The phosphor layer 140 is disposed within the second cavity 115, and the resin layer 150 is disposed within the first cavity 112. For example, the phosphor layer 140 may include a layer in which a yellow phosphor is added to a resin material such as silicon or epoxy. The phosphor layer 140 absorbs a portion of light emitted from the blue LED chip to emit yellow light. For example, when the light emitting device 130 includes the blue LED chip, and the phosphor layer 140 contains the yellow phosphor, the light emitting package 100 emits white light by mixing blue light with yellow light.

[0040] A surface of the phosphor layer 140 may have a fiat shape, a concave shape, or a convex shape, but is not limited thereto.

[0041] When the first wire 132 is disposed within the

second cavity 115, it may reduce or prevent a portion of a phosphor layer 140 dispensed or disposed into the second cavity 115 from ascending along the first wire 132 and the second wire 134. As a result, a color-coordinate distribution of light emitted from the light emitting device 130 may be reduced.

[0042] When the first and second wires 132 and 134 are disposed within the first cavity 112, the phosphor layer 140 disposed in the second cavity 115 may ascend along the first and second wires 132 and 134 during the dispensing or disposing process for the phosphor layer 140. As a result, the color-coordinate distribution through the phosphor layer 140 is wide to cause a non-uniform color-coordinate distribution of a white LED. Therefore, brightness and manufacturing yield may be reduced. According to embodiments, the first wire 132 may be disposed within the second cavity 115 to improve the color-coordinate distribution, the brightness, and the manufacturing yield.

[0043] According to the first embodiment, the second cavity 115 may be formed using the first lead electrode 121 to increase a light reflection amount.

[0044] The resin layer 150 may be disposed within the first cavity 112 and formed of the resin material such as the silicon (or silicon containing) or the epoxy, and in addition, the phosphor may be added or not be added to the resin layer 150, but is not limited thereto. A surface of the resin layer 150 may have one of a flat shape, a concave shape, a convex shape, an irregular shape, or other shapes.

[0045] Fig. 4 is a plan view of a light emitting device according to an embodiment. In the description of the embodiment, components and operations equal to those of the first example will be described with reference to the first example, and duplicated descriptions will be omitted.

[0046] Referring to Fig. 4, a light emitting device package 101 includes a package body 110 having a lower groove 11 IB, a first cavity 112, a second cavity 115, lead electrodes 121 and 123, a light emitting device 130, a phosphor layer 140, and a resin layer 150.

[0047] The lower groove 11 IB of the package body 110 may be stepped with respect to an outer bottom surface 11 IA of the package body 110. The lower groove 11 IB of the package body 110 may be concave to a predetermined depth with respect to the outer bottom surface 11 IA of the package body 110. The lower groove 11 IB and the outer bottom surface 11 IA of the package body 110 have thicknesses different from each other. Due to such a thickness difference D1, a space is defined in the lower groove, 11 IB of the package body 110. As a result, a bottom surface 12 IA of the first lead electrode 121 disposed within the second cavity 115 is exposed to the lower groove 11 IB of the package body 110.

[0048] Thus, heat is effectively radiated through the bottom surface 121A of the first lead electrode 121 disposed within the second cavity 115. Also, the lower groove 11 IB of the package body 110 may reduce or

prevent the package body 110 from being short-circuited due to solder failure when the package body 110 is mounted on a board PCB. A heat sink plate may be disposed in the lower groove 11 IB of the package body 110.

[0049] The first lead electrode 121 has one end P3 disposed on the outer bottom surface 11 IA of the package body 110, and the second lead electrode 123 has the other end P4 disposed on the opposite outer bottom surface 11 IA of the package body 110.

[0050] Fig. 5 is a plan view of a second example of a light emitting device. In the description of the example, components and operations equal to those of the first example will be described with reference to the first example, and duplicated descriptions will be omitted.

[0051] Referring to Fig. 5, a light emitting device package IOOA includes a package body 110, a first cavity 112, a second cavity 115, lead electrodes 121 and 123, a light emitting device 130, a phosphor layer, a resin layer 150, and a lens layer 160.

[0052] An injection molded part having a predetermined shape is disposed on the package body 110, and then, a transparent resin material is injected thereon to form the lens layer 160 having a shape equal to that of an inner surface of the injection molded part.

[0053] The lens layer 160 has a structure that convexly protrudes in hemisphere shapes toward the outer sides of the package body 110 about the center or a center portion of the package body 110 (when viewed from the package body). For example, the lens layer 160 may be formed in a parabolic shape having a smoothly bent or curved surface. In other embodiments, an abruptly changing surface or a step surface is also possible.

[0054] The lens layer 160 condenses light emitted from the first cavity 112 into a predetermined region. The configuration of the lens layer 160 is just one example and is not limited to the parabolic, shape.

[0055] Fig. 6 is a plan view of a third example of a light emitting device. In the description of the example, components and operations equal to those of the first example will be described with reference to the first example, and duplicated descriptions will be omitted.

[0056] Referring to Fig. 6, a light emitting device package 100B includes a package body 110, a first cavity 112, a second cavity 115, lead electrodes 121 and 123, a light emitting device 130, a phosphor layer 140, a resin layer 150, and a lens layer 160A.

[0057] The lens layer 160A is formed in a convex hemisphere shape on the package body 110. The lens layer 160A may be formed by an injection molded part and/or separately attached.

[0058] Referring to Figs. 5 and 6, the lens layer 160 or 106A disposed on the package body 110 may be variously modified in configuration and is not limited to the above-described structure.

[0059] Fig. 7 is a plan view of a fourth example of a light emitting device. In the description of the example, components and operations equal to those of the first example will be described with reference to the first ex-

ample, and duplicated descriptions will be omitted.

[0060] Referring to Fig. 7, a light emitting device package 200 includes a package body 210, a first cavity 212, a second cavity 215, lead electrodes 221 and 223, a light emitting device 230, a phosphor layer 240, and a resin layer 250.

[0061] The first cavity 212 having a predetermined depth is defined within the package body 210. The second cavity 215 having a predetermined depth is defined in a central region of the first cavity 212.

[0062] A portion 216A of a lateral surface of the second cavity 215 may be defined by the package body 210, and remaining portions of the second cavity 215 may be defined by the first lead electrode 221 and the package body 210. That is, a side of the first lead electrode 221 may be stepped to constitute a bottom surface of the second cavity 215, and most of the lateral surface of the second cavity 215 may be defined by the package body 210. Also, a portion of the first lead electrode 221 disposed within the second cavity 215 may be exposed to a bottom surface of the package body 210 to effectively radiate heat.

[0063] A groove 211 of the first cavity 212 is formed by an injection modeling to expose a portion of the second lead electrode 223. Here, most of a bottom surface of the first cavity 212 may be defined by the package body 210.

[0064] The light emitting device 230 adheres to a top surface of the first lead electrode 221 using an adhesive. The first wire 232 electrically connects the first lead electrode 221 to the light emitting device 230 within the second cavity 215, and the second wire 234 electrically connects the second lead electrode 223 exposed to the groove 211 defined in the other side of the first cavity 212 to the light emitting device 230.

[0065] The light emitting device 230-may include various color LED chips. For a case in which the light emitting device 230 is at least one blue LED chip, the phosphor layer 240 to which a yellow phosphor is added is disposed within the second cavity 215. At this time, since the first wire 232 is disposed within the second cavity 215, it may reduce or prevent a portion of the phosphor layer 240 from ascending along the wires 232 and 234. Also, in the fifth embodiment, the package body 210 may constitute all lateral surfaces 216A and 216 of the first cavity 212 and the second cavity 215.

[0066] The resin layer 250 is disposed within the first cavity 212. The resin layer 250 may be formed of a resin material such as a silicon resin or an epoxy resin, and in addition, the phosphor may be added or not be added to the resin material, but is not limited thereto.

[0067] A lens layer may be disposed on the package body 210, but is not limited thereto. Also, an outer bottom surface of the package body 210 may be stepped, like the embodiment shown in Fig. 4.

[0068] Fig. 8 is a plan view of a fifth example of a light emitting device. In the description of the example, components and operations equal to those of the first exam-

ple will be described with reference to the first example, and duplicated descriptions will be omitted.

[0069] Referring to Fig. 8, a light emitting device package 300 includes a package body 310, a first cavity 312, a second cavity 315, a light emitting device 330, first and second lead electrodes 321 and 323, a phosphor layer 340, and a resin layer 350.

[0070] The package body 310 may be formed of a silicon material, for example, the package body 310 may be formed using a wafer level package (WLP) technology and have a polyhedral shape (e.g., hexahedral shape). The first cavity 312 is defined inside an upper portion of the package body 310, and a surface of the first cavity 312 may have a polygonal shape, a circular shape, an oval shape, an irregular shape, or other shapes. The first cavity 312 may be formed with a predetermined depth using a dry etching process and/or a wet etching process, but is not limited thereto.

[0071] A lateral surface 313 of the first cavity 312 may be perpendicular to or inclined to a bottom surface thereof, and the lateral surface 313 may improve a light reflection amount.

[0072] The second cavity 315 having a predetermined depth is defined under a central region of the first cavity 312. The second cavity 315 may have a polygonal shape, a circular shape, an oval shape, an irregular shape, or other shapes. The second cavity 315 may be formed with a predetermined depth using a dry etching process and/or a wet etching process.

[0073] A dielectric may be disposed on a surface of the package body 310, but is not limited thereto. The first lead electrode 321 and the second lead electrode 323 are disposed on the surface of the package body 310.

[0074] The first lead electrode 321 is disposed on the other side surface of the package body 310, and the second lead electrode 323 is disposed on one side surface of the package body 310. The first lead electrode 321 is disposed along a bottom surface and a lateral surface of the first cavity 312 and along an outer surface of the other side of the package body 310 to extend up to a portion of a bottom surface of the package body 310.

[0075] The second lead electrode 323 is integrally disposed along a portion of the bottom surface of the first cavity 312, a lateral surface and a bottom surface of the second cavity 315, and the outer surface of the package body 310 to extend up to a portion of the bottom surface of the package body 310.

[0076] A mask pattern may be disposed on the first lead electrode 321 and the second lead electrode 323 to form a metal electrode layer using sputter equipment, but is not limited thereto.

[0077] Outer ends P1 and P2 of the first lead electrode 321 and the second lead electrode 323, which are disposed on the outer surface of the package body 310, may be used as external electrodes.

[0078] The light emitting device 330 adheres to the first lead electrode 321 within the first cavity 312 using an adhesive. A first wire 332 electrically connects the light

emitting device 330 to the second lead electrode 323. Here, since a bonding portion of the first wire 332 is connected to the second lead electrode 323 within the second cavity 315, the first wire 332 may be disposed within the second cavity 315. Thus, it may reduce or prevent the phosphor layer 340 molded to the second cavity 315 from ascending along the first wire 332 and a second wire 334.

[0079] The second wire 334 electrically connects the light emitting device 330 to the second lead electrode 321 within the first cavity 312.

[0080] The phosphor layer 340 is disposed within the second cavity 315, and a colored phosphor, for example, a yellow phosphor may be added to a resin material such as silicon, silicon resin, or an epoxy to form the phosphor layer 340. Here, the resin layer 350 may be disposed before or after the phosphor layer 340 is hardened.

[0081] The transparent resin layer 350 is disposed within the first cavity 312. The resin layer 350 may be formed of a resin material such as silicon or epoxy, and in addition, the phosphor may be added or not added to the resin material, but is not limited thereto.

[0082] Since the first wire 332 is disposed within the second cavity 315 including the phosphor layer 340, it may reduce or prevent the phosphor layer 340 from ascending along the wires 332 and 334 to a predetermined height.

[0083] The phosphor layer 340 may have a flat shape, and the resin layer 350 may have one of a flat shape, concave shape, and a convex shape.

[0084] The light emitting device package according to the embodiments may be realized in a top view or side view type. Also, the light emitting device package may be disposed in an array form in a portable terminal, a notebook computer, etc. Thus, the light emitting device package may be provided as a lighting unit or variously applicable to devices such as an illumination device, an indication device, etc.

[0085] According to the embodiments, the color-coordinate distribution of the white light of the light emitting device package may be minimized.

[0086] According to the embodiments, the light emitting device package may improve the color-coordinate yield of the white light.

[0087] According to the embodiments, the color-coordinate yield may be improved, and the heat may be effectively radiated to improve the reliability of the light emitting device package.

[0088] Embodiments may provide the light emitting device package using the LED.

[0089] Embodiments may be applicable to the lighting unit such as display devices, illumination devices, and indication devices, etc.

[0090] Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the scope of the in-

vention defined in the claims. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art. Industrial Applicability

[0091] Embodiments may provide the light emitting device package using the LED.

[0092] Embodiments may be applicable to the lighting unit such as display devices, illumination devices, and indication devices, etc.

Claims

1. A light emitting device package, comprising:

a package body (110) comprising a first recess (112), and a second recess (115) connected to the first recess (112), wherein the second recess (115) is defined at predetermined position under the first recess (112), wherein the first recess (112) and the second recess (115) are formed in an upper surface of the package wherein the package body (110) comprises a step portion between the first recess (112) and the second recess (115),

a first lead electrode (121), at least a portion of which is disposed in the second recess (115);
a second lead electrode (123), at least a portion of which is disposed in the first recess (112);
a light emitting device (130) disposed in the second recess (115);

a first wire (132) electrically connecting the light emitting device (130) to the first lead electrode (121); and

a second wire (134) electrically connecting the light emitting device (130) to the second lead electrode (123),

wherein the first lead electrode (121) covers a bottom surface and a side surface of the second recess (115),

wherein the first lead electrode (121) has a first end (P1) exposed to one side of the package body (110),

wherein a bottom surface (111A) of the package body (110) has a lower groove (111B) that is concave with respect to the bottom surface (111A) of the package body (110),

wherein the lower groove (111B) of the package body (110) is a vacant space, and

wherein the bottom surface of the first lead electrode (121) disposed in the second recess (115) is exposed to the lower groove of the package body (110), and is flush with the bottom surface of the package body (110) within the lower

groove of the package body

2. The light emitting device package according to claim 1, wherein the first lead electrode (121) has a second end (P3) disposed on the outer bottom surface (111A) of the package body 110, and the bottom surface of the first lead electrode (121) is higher than a bottom surface of the second end (P3) of the first lead electrode (121).

3. The light emitting device package according to claim 1 or 2, wherein the first lead electrodes (121) has a second end disposed on the step portion of the package body 1101.

4. The light emitting device package according to claim 1 or 2 or 3, wherein a top surface of the second end portion of the first lead electrode (121) is flush with a bottom surface of the first recess.

5. The light emitting device package according to claim 1, further comprising a phosphor layer (140) contained in the second recess (115).

6. The light emitting device package according to claim 1, wherein the first wire (132) is disposed entirely in the second recess (115).

7. The light emitting device package according to claim 6, wherein the first wire (132) is disposed entirely in the phosphor layer (140).

8. The light emitting device package according to claim 1, wherein the light emitting device (130) comprises at least one of a red LED chip, a green LED chip, a blue LED chip and an ultraviolet (UV) LED chip.

9. The light emitting device package according to claim 1, wherein the first lead electrode (121) and the second lead electrode (123) each comprises a lead frame or a metal layer.

10. The light emitting device package according to claim 1, wherein the second recess (115) is defined by a portion of the first lead electrode (121).

11. The light emitting device package according to claim 6, wherein a portion of the phosphor layer (140) or a resin layer (150) is disposed in the first recess (112) of the package body (110).

12. The light emitting device package according to claim 1, wherein the package body (110) comprises a groove (211) of the first cavity (211) formed to expose a portion of the second lead electrode (223).

13. A lighting unit comprising the light emitting device package according to claims 1 to 12.

Patentansprüche

1. Gehäuse mit lichtemittierender Vorrichtung, umfassend:

einen Gehäusekörper (110), umfassend eine erste Aussparung (112) und eine mit der ersten Aussparung (112) verbundene zweite Aussparung (115), wobei die zweite Aussparung (115) an einer vorgegebenen Position unter der ersten Aussparung (112) definiert ist, wobei die erste Aussparung (112) und die zweite Aussparung (115) in einer oberen Oberfläche des Gehäuses ausgebildet sind, wobei der Gehäusekörper (110) zwischen der ersten Aussparung (112) und der zweiten Aussparung (115) einen Stufenabschnitt umfasst,

eine erste Anschlusselektrode (121), wobei wenigstens ein Abschnitt derselben in der zweiten Aussparung (115) angeordnet ist;

eine zweite Anschlusselektrode (123), wobei wenigstens ein Abschnitt derselben in der ersten Aussparung (112) angeordnet ist;

eine lichtemittierende Vorrichtung (130), die in der zweiten Aussparung (115) angeordnet ist;

einen ersten Draht (132), der die lichtemittierende Vorrichtung (130) elektrisch mit der ersten Anschlusselektrode (121) verbindet; und

einen zweiten Draht (134), der die lichtemittierende Vorrichtung (130) elektrisch mit der zweiten Anschlusselektrode (123) verbindet,

wobei die erste Anschlusselektrode (121) eine Bodenfläche und eine Seitenfläche der zweiten Aussparung (115) abdeckt,

wobei die erste Anschlusselektrode (121) ein erstes Ende (P1) aufweist, das zu einer Seite des Gehäusekörpers (110) freiliegt,

wobei eine Bodenfläche (111A) des Gehäusekörpers (110) eine untere Nut (111B) aufweist, die bezogen auf die Bodenfläche (111A) des Gehäusekörpers (110) konkav ist,

wobei die untere Nut (111B) des Gehäusekörpers (110) ein leerer Raum ist und wobei die Bodenfläche der in der zweiten Aussparung (115) angeordneten ersten Anschlusselektrode (121) zu der unteren Nut des Gehäusekörpers (110) freiliegt und innerhalb der unteren Nut des Gehäusekörpers mit der Bodenfläche des Gehäusekörpers (110) fluchtet.

2. Gehäuse mit lichtemittierender Vorrichtung nach Anspruch 1, wobei die erste Anschlusselektrode (121) ein zweites Ende (P3) aufweist, das auf der äußeren Bodenfläche (111A) des Gehäusekörpers (110) angeordnet ist, und die Bodenfläche der ersten Anschlusselektrode (121) höher ist als eine Bodenfläche des zweiten Endes (P3) der ersten Anschlusselektrode (121).

3. Gehäuse mit lichtemittierender Vorrichtung nach Anspruch 1 oder 2, wobei die erste Anschlusselektrode (121) ein zweites Ende aufweist, das auf dem Stufenabschnitt des Gehäusekörpers (110) angeordnet ist.

4. Gehäuse mit lichtemittierender Vorrichtung nach Anspruch 1 oder 2 oder 3, wobei eine obere Oberfläche des zweiten Endabschnitts der ersten Anschlusselektrode (121) mit einer Bodenfläche der ersten Aussparung fluchtet.

5. Gehäuse mit lichtemittierender Vorrichtung nach Anspruch 1, das weiterhin eine in der zweiten Aussparung (115) enthaltene Leuchtstoffschicht (140) umfasst.

6. Gehäuse mit lichtemittierender Vorrichtung nach Anspruch 1, wobei der erste Draht (132) vollständig in der zweiten Aussparung (115) angeordnet ist.

7. Gehäuse mit lichtemittierender Vorrichtung nach Anspruch 6, wobei der erste Draht (132) vollständig in der Leuchtstoffschicht (140) angeordnet ist.

8. Gehäuse mit lichtemittierender Vorrichtung nach Anspruch 1, wobei die lichtemittierende Vorrichtung (130) einen roten LED-Chip, einen grünen LED-Chip, einen blauen LED-Chip und/oder einen ultraviolett (UV) LED-Chip umfasst.

9. Gehäuse mit lichtemittierender Vorrichtung nach Anspruch 1, wobei die erste Anschlusselektrode (121) und die zweite Anschlusselektrode (123) jeweils ein Leadframe oder eine Metallschicht umfassen.

10. Gehäuse mit lichtemittierender Vorrichtung nach Anspruch 1, wobei die zweite Aussparung (115) durch einen Abschnitt der ersten Anschlusselektrode (121) definiert ist.

11. Gehäuse mit lichtemittierender Vorrichtung nach Anspruch 6, wobei in der ersten Aussparung (112) des Gehäusekörpers (110) ein Abschnitt der Leuchtstoffschicht (140) oder eine Harzschicht (150) angeordnet ist.

12. Gehäuse mit lichtemittierender Vorrichtung nach Anspruch 1, wobei der Gehäusekörper (110) eine Nut (211) des ersten Hohlraums (211) umfasst, die ausgebildet ist, um einen Abschnitt der zweiten Anschlusselektrode (223) freizulegen.

13. Beleuchtungseinheit, die das Gehäuse mit lichtemittierender Vorrichtung nach den Ansprüchen 1 bis 12 umfasst.

Revendications

1. Boîtier de dispositif électroluminescent, comprenant :

un corps de boîtier (110) comprenant un premier évidement (112), et un second évidement (115) connecté au premier évidement (112), dans lequel le second évidement (115) est défini à une position prédéterminée sous le premier évidement (112), dans lequel le premier évidement (112) et le second évidement (115) sont formés dans une surface supérieure du boîtier, dans lequel le corps de boîtier (110) comprend une partie gradin entre le premier évidement (112) et le second évidement (115), une première électrode de connexion (121), dont au moins une partie est disposée dans le second évidement (115) ; une seconde électrode de connexion (123), dont au moins une partie est disposée dans le premier évidement (112) ; un dispositif électroluminescent (130) disposé dans le second évidement (115) ; un premier fil (132) connectant électriquement le dispositif électroluminescent (130) à la première électrode de connexion (121) ; et un second fil (134) connectant électriquement le dispositif électroluminescent (130) à la seconde électrode de connexion (123), dans lequel la première électrode de connexion (121) couvre une surface inférieure et une surface latérale du second évidement (115), dans lequel la première électrode de connexion (121) comporte une première extrémité (P1) exposée à un côté du corps de boîtier (110), dans lequel une surface inférieure (111A) du corps de boîtier (110) comporte une rainure inférieure (111B) qui est concave par rapport à la surface inférieure (111 A) du corps de boîtier (110), dans lequel la rainure inférieure (111B) du corps de boîtier (110) est un espace vide, et dans lequel la surface inférieure de la première électrode de connexion (121) disposée dans le second évidement (115) est exposée à la rainure inférieure du corps de boîtier (110), et est alignée avec la surface inférieure du corps de boîtier (110) à l'intérieur de la rainure inférieure du corps de boîtier.

2. Boîtier de dispositif électroluminescent selon la revendication 1, dans lequel la première électrode de connexion (121) comporte une seconde extrémité (P3) disposée sur la surface inférieure extérieure (111A) du corps de boîtier (110), et la surface inférieure de la première électrode de connexion (121) est plus élevée qu'une surface inférieure de la se-

conde extrémité (P3) de la première électrode de connexion (121).

3. Boîtier de dispositif électroluminescent selon la revendication 1 ou 2, dans lequel la première électrode de connexion (121) comporte une seconde extrémité disposée sur la partie gradin du corps de boîtier (110).
4. Boîtier de dispositif électroluminescent selon la revendication 1 ou 2 ou 3, dans lequel une surface supérieure de la seconde partie d'extrémité de la première électrode de connexion (121) est alignée avec une surface inférieure du premier évidement.
5. Boîtier de dispositif électroluminescent selon la revendication 1, comprenant en outre une couche de phosphore (140) contenue dans le second évidement (115).
6. Boîtier de dispositif électroluminescent selon la revendication 1, dans lequel le premier fil (132) est disposé entièrement dans le second évidement (115).
7. Boîtier de dispositif électroluminescent selon la revendication 6, dans lequel le premier fil (132) est disposé entièrement dans la couche de phosphore (140).
8. Boîtier de dispositif électroluminescent selon la revendication 1, dans lequel le dispositif électroluminescent (130) comprend au moins une d'une puce à LED rouge, d'une puce à LED verte, d'une puce à LED bleue et d'une puce à LED ultraviolette (UV).
9. Boîtier de dispositif électroluminescent selon la revendication 1, dans lequel la première électrode de connexion (121) et la seconde électrode de connexion (123) comprennent chacune une grille de connexion ou une couche métallique.
10. Boîtier de dispositif électroluminescent selon la revendication 1, dans lequel le second évidement (115) est défini par une partie de la première électrode de connexion (121).
11. Boîtier de dispositif électroluminescent selon la revendication 6, dans lequel une partie de la couche de phosphore (140) ou une couche de résine (150) est disposée dans le premier évidement (112) du corps de boîtier (110).
12. Boîtier de dispositif électroluminescent selon la revendication 1, dans lequel le corps de boîtier (110) comprend une rainure (211) de la première cavité (211) formée pour exposer une partie de la seconde électrode de connexion (223).

13. Unité d'éclairage comprenant le boîtier de dispositif électroluminescent selon les revendications 1 à 12.

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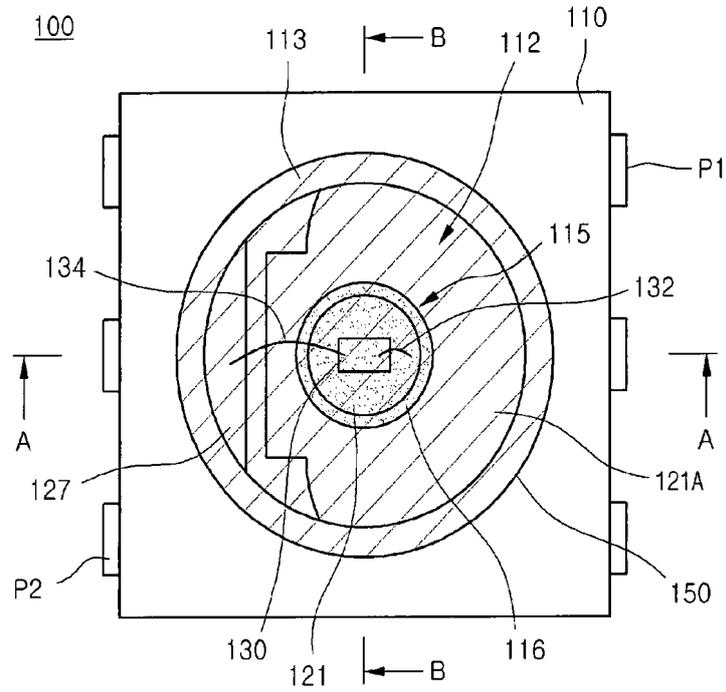
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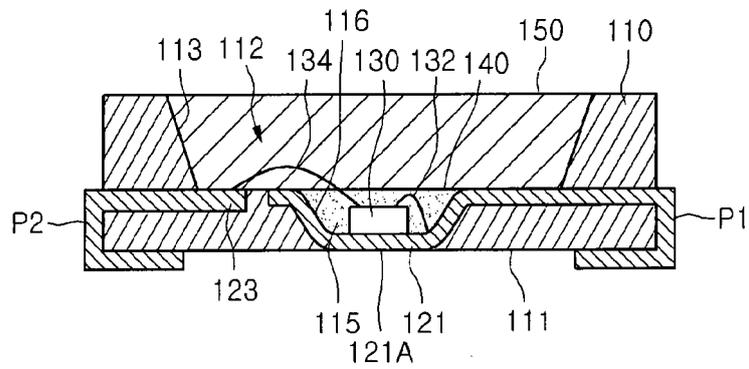
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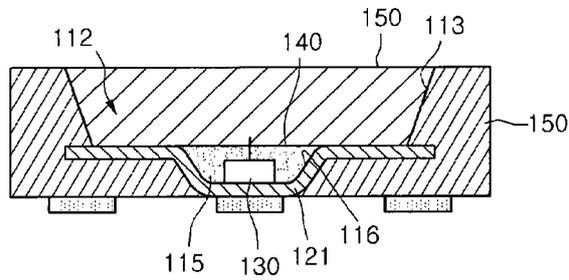
[Fig. 1]



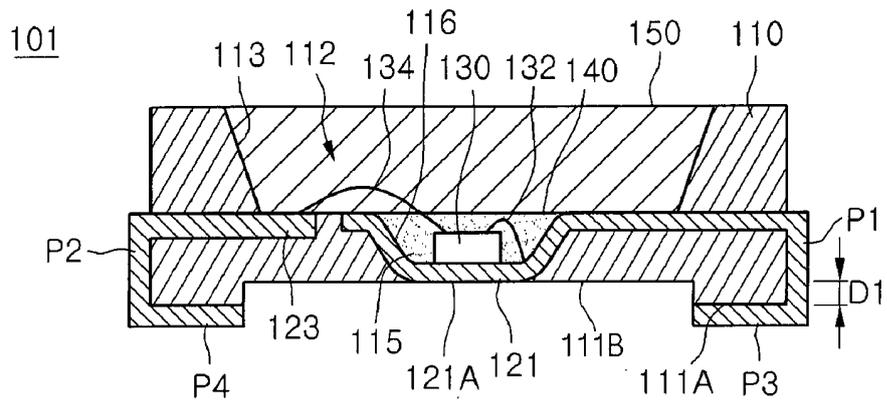
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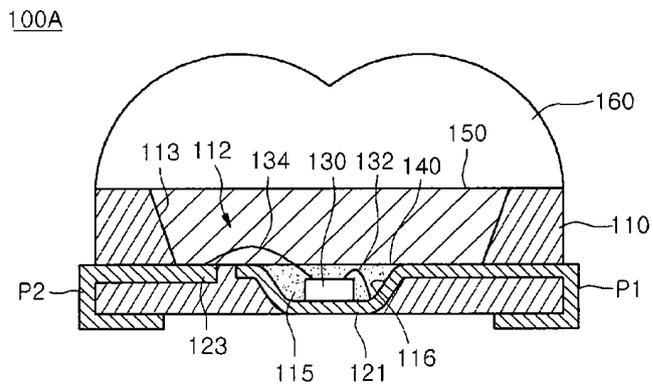
[Fig. 3]



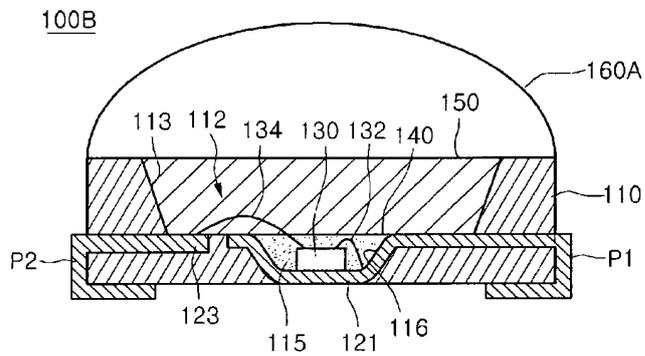
[Fig. 4]



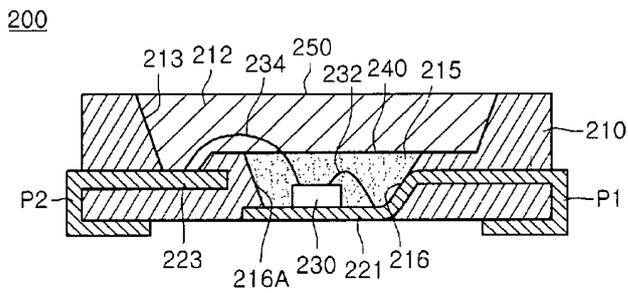
[Fig. 5]



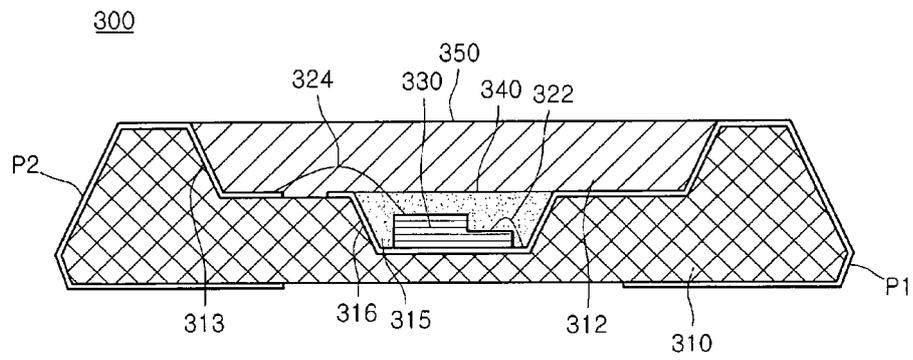
[Fig. 6]



[Fig. 7]



[Fig. 8]



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2007081313 A [0004]
- KR 100691441 [0004]